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EMC TEST REPORT For FCC



Test Report No. : CTK-2013-01240
Date of Issue : 2013-08-01
FCC ID : SSNLSM3001306
Kind of Product : Wireless scanner mouse
Basic Model/Type No. : LSM300BB
Variant Model/Type No. : LSM300RB, LSM300PB
Applicant : LG Electronics Inc.
Applicant Address : 50, Hyangjeong-dong, Heungdeok-gu, Cheongju-si,
Chungcheongbuk-do, 361-480, Korea
Manufacturer : LG Electronics Inc.
Manufacturer Address : 50, Hyangjeong-dong, Heungdeok-gu, Cheongju-si,
Chungcheongbuk-do, 361-480, Korea
Contact Person : Jung Yong Lee
Telephone : +82-43-279-3071
Received Date : 2013-07-18
Test period : Start : 2013-07-22 End : 2013-07-24
Test Results : ☒ In Compliance ☐ Not in Compliance

The test results presented in this report relate only to the object tested.

Tested by

Sang-Kyun PARK
EMC Test Engineer
Date: 2013-08-01

Reviewed by

Eun-Won Lee
EMC Technical Manager
Date: 2013-08-01



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REPORT REVISION HISTORY

Date	Revision	Page No
2013-08-01	Issued (CTK-2013-01240)	All

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1.0 General Product Description

No.	ITEM	APPLICATION
1	Kind of Product	Wireless scanner mouse
2	Basic Model/Type No.	LSM300BB
3	Variant Model/Type No.	LSM300RB, LSM300PB
4	Dimensions (mm)	124 (W) x 61 (L) x 37 (H)
5	Mobility	☒ Table-top ☐ Floor-standing ☐ Built-in ☐ Portable
6	Maximum Clock Frequency	16 MHz
7	Electrical Ratings	Input: 5 Vdc (Mains of USB Port)
		Output: -
8	Test Voltage / Frequency	Voltage: 120 Vac (Mains of Notebook)
		Frequency: 60 Hz

1.1 Model Differences

Not applicable

1.2 Device Modifications

The following modifications were necessary for compliance:

- LSM300BB is Basic model.
- Because the alternative model LSM300RB, LSM300PB is same as basic model LSM300BB except for color, There is no need to test.
- LSM300BB : Color -> Black
- LSM300RB : Color -> Red
- LSM300PB : Color -> Purple

1.3 EUT Configuration(s)

See Appendix A for individual test set-up configuration(s). The following peripheral devices and/or interface cables were connected during the measurement:

☒ Peripheral Devices

Device	Model No.	Serial No.	Manufacturer
Notebook	NT-R470	ZMI593FSA00244Y	Samsung Electronics Co., Ltd.
Adapter	CPA09-004A	-	Hipro Electronics (Suzhou) Co., Ltd.

☒ Cable Description

No.	From		To		Type of Cable		
	Device	I/O Port	Device	I/O Port	Length (m)	Shielded or Unshielded	Ferrite Core [Y/N]
1	EUT	USB	Notebook	USB	1.2	U	N
2	Notebook	DC IN	Adapter	DC OUT	1.5	U	Y
3	Adapter	AC Power	AC Mains	-	1.8	U	N

* Shielded or Unshielded : Unshielded=U, Shielded=S

1.4 Test Software

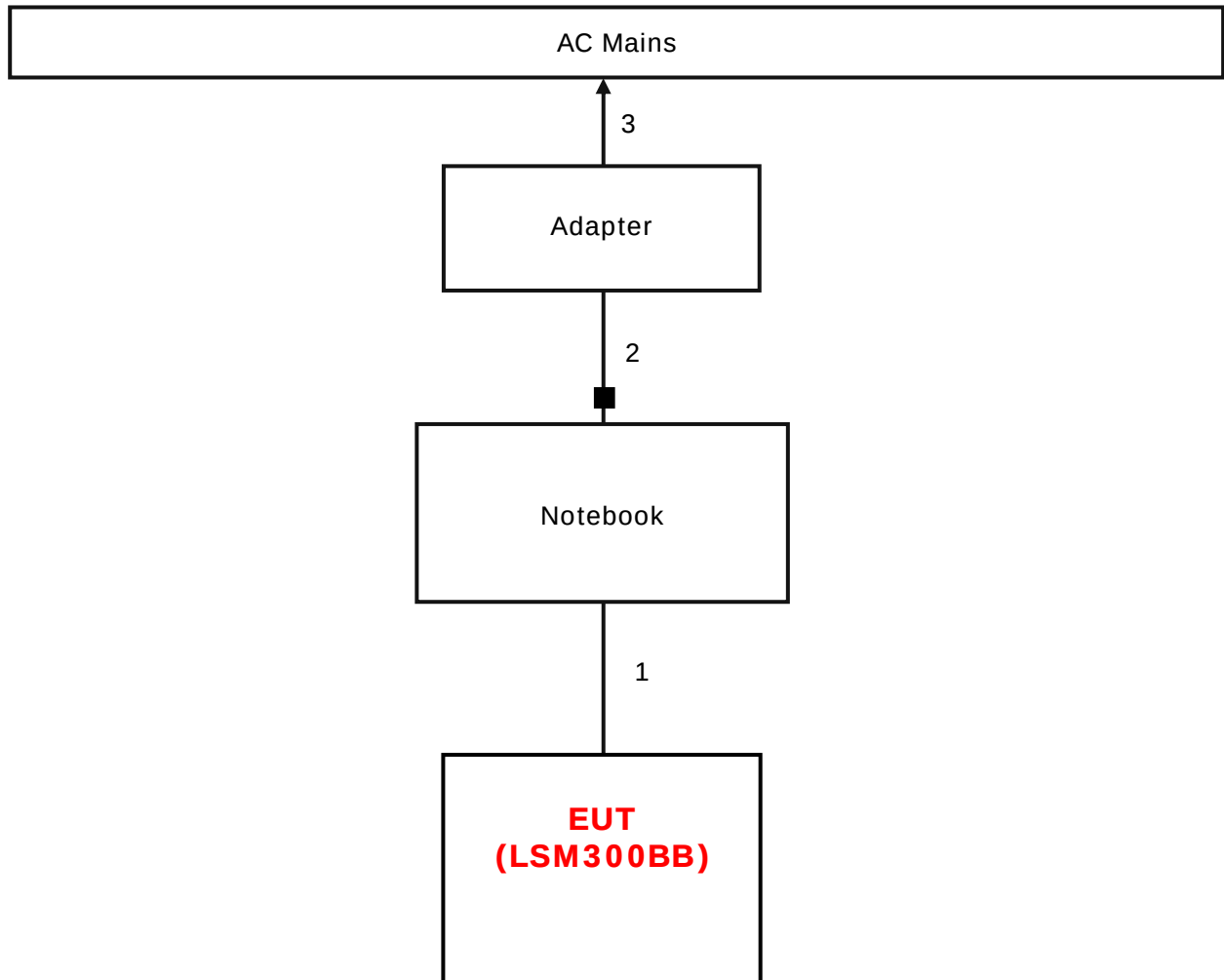
- ☐ EMC Test V 1.0
☐ Display Test Patterns – V1.5
☐ Ping.exe
☒ Production-Deployment-2.0.0.211
☐ Not applicable

1.5 EUT Operating Mode(s)

Equipment under test was operated during the measurement under the following conditions:

- | | |
|---|--|
| ☐ Standby | ☐ Scrolling 'H' |
| ☐ Color Bar Display | ☐ Data Read/Write |
| ☐ USB PLAY | ☐ DVD Play |
| ☐ USB Data Communication | ☐ Serial Data Communication |
| ☐ AUX IN | ☐ Receipt Printing Mode |
| ☐ DLNA | ☒ Scanning Mode |

1.6 Configuration





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1.7 Calibration Details of Equipment Used for Measurement

Test equipment and test accessories are calibrated on regular basis. The maximum time between calibrations is one year or what is recommended by the manufacturer, whichever is less. All test equipment calibrations are traceable to the Korea Research Institute of Standards and Science (KRISS), therefore, all test data recorded in this report is traceable to KRISS.

1.8 Test Facility

The measurement facility is located at 386-1, Ho-dong, Cheoin-gu, Yongin-si, Gyeonggi-do, 449-100, Korea. The sites are constructed in conformance with the requirements of ANSI C63.7, ANSI C63.4 and CISPR Publication 22.

1.9 Measurement Procedure

Preliminary AC power line conducted emissions tests were performed shielded room. To find worst mode, several typical mode and typical cable position were tested. Final AC power line conducted emissions test was performed shielded room. (location is same as Preliminary test)

Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

Preliminary radiated emissions test were performed Semi-Anechoic Chamber or anechoic chamber (Distance of antenna and EUT was 3 m). To find worst mode, several typical mode and typical cable position were tested and peak level and frequency were recorded.

Final radiated emissions test was performed Semi-Anechoic Chamber. Based on the preliminary tests of the EUT, final test was proceeded worst case test mode and cable configuration.

* Measurement procedures was In accordance with ANSI C63.4-2009 7.3.3, 7.3.4, 8.3.1.1, 8.3.1.2, 8.3.2.1, 8.3.2.2

1.10 Laboratory Accreditations and Listings

Country	Agency	Scope of Accreditation	Logo
USA	FCC	3 m & 10 m SAC and Conducted Test Site to perform FCC Part 15/18 measurements	 805871
JAPAN	VCCI	3 m & 10 m SAC and Conducted Test Site	 C-986, T-1843, R-3627, G-387
KOREA	KCC	EMI (3 m & 10 m SAC and Conducted Test Site) EMS (ESD, RS, EFT/Burst, Surge, CS, Magnetic, Dips and Interruptions)	 No. 51, KR0025

1.11 Measurement Uncertainty

Compliance of the product is based on the measured value.

However, the measurement uncertainty is included for information purposes.

The measurement uncertainties given below are based on a standard uncertainty multiplied by a coverage factor of $k=2$, providing a level of confidence of approximately 95 %.

Measurement Type	Frequency Range	Expanded Uncertainty
Conducted Emission	150 kHz to 30 MHz	± 2.66 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	30 MHz to 1000 MHz	± 3.66 dB (C.L.: Approx. 95 %, $k=2$)
Radiated Emission	1 GHz Above	± 4.16 dB (C.L.: Approx. 95 %, $k=2$)



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2.0 EMC Test Regulations / Standards

The tests were performed according to following regulations:

Applied standard	Title	Applied	Test Result
FCC Part 15 Subpart B ☐ Class A ☒ Class B	Conducted Voltage Emissions	☒	☒ MET ☐ NOT MET
	Radiated Electric Field Emissions	☒	☒ MET ☐ NOT MET



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3.0 Results of Individual Test

3.1 Conducted Voltage Emissions of Mains ports

Test Date

2013-07-22

Test Location

Shielded Room

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100816	2013-12-14	☒
LISN	ENV216	Rohde & Schwarz	101235	2013-08-06	☒
LISN	ENV216	Rohde & Schwarz	101236	2013-08-06	☐
EMI Test Receiver	ESCI3	Rohde & Schwarz	100032	2014-02-04	☐
LISN	ENV216	Rohde & Schwarz	101151	2013-11-09	☐
LISN	ESH3-Z5	Rohde & Schwarz	100207	2013-11-09	☐
EMI Test Receiver	ESHS30	Rohde & Schwarz	862024/001	2014-02-05	☐
LISN	ENV216	Rohde & Schwarz	101150	2014-02-04	☐
LISN	3825/2	EMCO	9607-2575	2013-07-17	☐

Test Software

ESCI7, ESCI3 : EMC32 Ver. 8.50.0

ESHS30 : ESxS-K1 ver. 2.12

Frequency Range of Measurement

150 kHz to 30 MHz

Instrument Setting

IF Band Width: 9 kHz

Climate Condition

Temperature: (21 ± 1) °C

Relative Humidity: (46 ± 1) %

Atmospheric Pressure: 98 kPa

Test Result

The requirements are: ☒ MET ☐ NOT MET

Frequency (MHz)	Measured Data (dBμV)	Margin (dB)	Remark
14.208 000	42.1	7.9	Average

The Result is calculated by using the following formula;

* Result = Limit – Margin (Result included the correction factor)

* Correction factor = Cable Loss + Insertion loss of LISN



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Test Data

[Line: L1]

EMI Auto Test(2)

1 / 2

Test Report

Common Information

Test Model Name: LSM300xB
Test Mode: Scanning Mode
Manufacturer: LG ELECTRONICS
Tester: Park Sang-Kyun

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101235) - [EMI conducted]

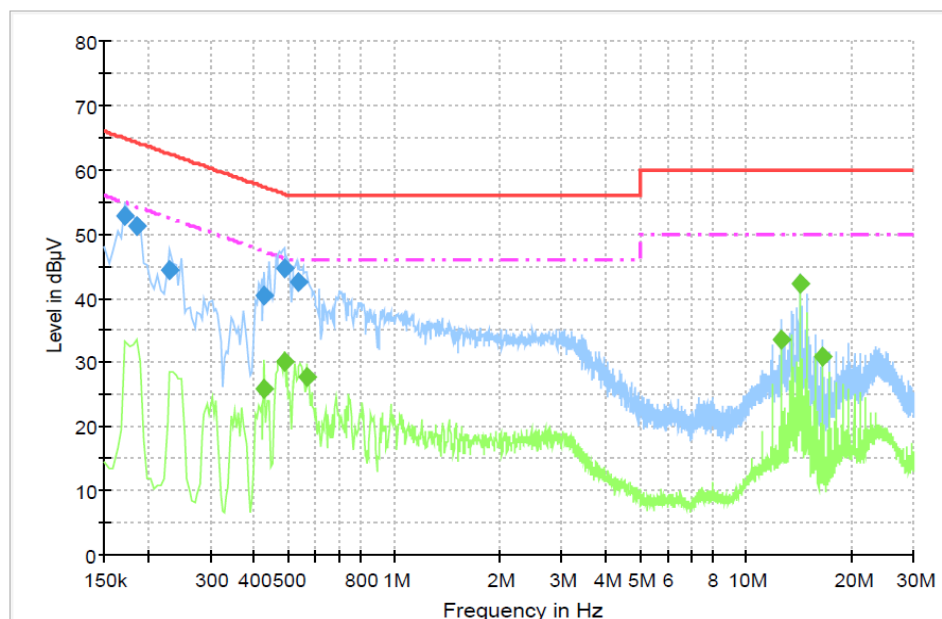
Subrange 1

Frequency Range: 150 kHz - 30 MHz

Receiver: ESCI 7 [ESCI 7]
@ GPIB0 (ADR 20), SN 100816/007, FW 4.42
Signal Path: ESCI 7-ENV216 FO(101235)
FW 1.0

LISN: Correction Table: 3CE Cable Loss
ENV216 FO(101235)
Correction Table (Line 0): ENV216_FO_N(101235)
Correction Table (Line 1): ENV216_FO_L1(101235)

3CE_CISPR 22 Class B_L1



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EMI Auto Test(2)

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.172500	52.7	1000.0	9.000	On	L1	10.1	12.1	64.8
0.186000	51.2	1000.0	9.000	On	L1	10.0	13.0	64.2
0.231000	44.3	1000.0	9.000	On	L1	9.9	18.1	62.4
0.429000	40.5	1000.0	9.000	On	L1	10.1	16.8	57.3
0.487500	44.6	1000.0	9.000	On	L1	10.1	11.6	56.2
0.537000	42.6	1000.0	9.000	On	L1	10.1	13.4	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.429000	25.8	1000.0	9.000	On	L1	10.1	21.5	47.3
0.487500	30.1	1000.0	9.000	On	L1	10.1	16.2	46.2
0.564000	27.7	1000.0	9.000	On	L1	10.1	18.3	46.0
12.673500	33.5	1000.0	9.000	On	L1	9.8	16.5	50.0
14.208000	42.1	1000.0	9.000	On	L1	9.8	7.9	50.0
16.512000	30.9	1000.0	9.000	On	L1	9.8	19.1	50.0

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[Line : Neutral]

EMI Auto Test(2)

1 / 2

Test Report

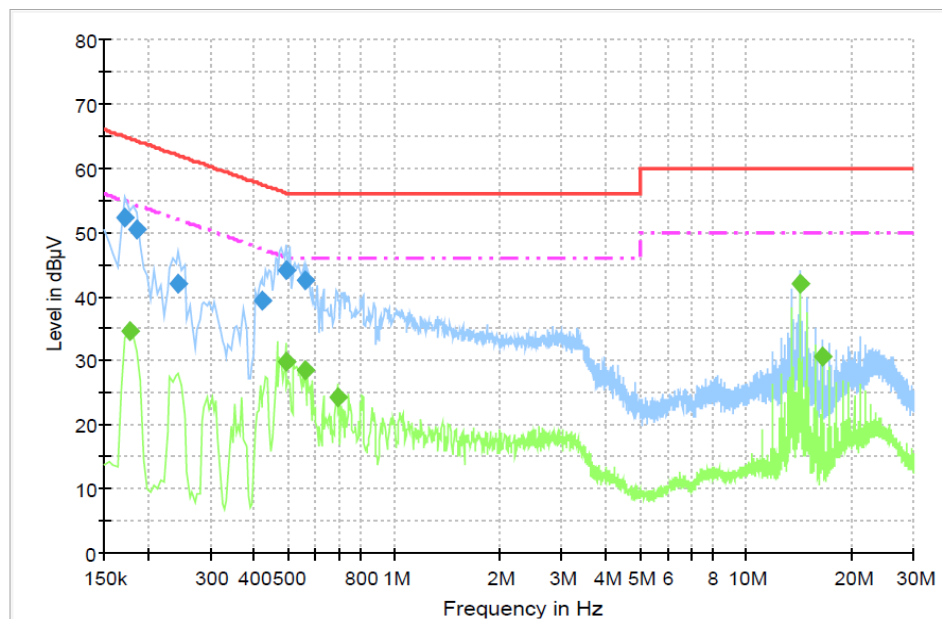
Common Information

Test Model Name: LSM300xB
Test Mode: Scanning Mode
Manufacturer: LG ELECTRONICS
Tester: Park Sang-Kyun

Hardware Setup: EMI conducted\Voltage with ENV216_FO(101235) - [EMI conducted]

Subrange 1
Frequency Range: 150 kHz - 30 MHz
Receiver: ESCI 7 [ESCI 7]
@ GPIB0 (ADR 20), SN 100816/007, FW 4.42
Signal Path: ESCI 7-ENV216 FO(101235)
FW 1.0
Correction Table: 3CE Cable Loss
LISN: ENV216 FO(101235)
Correction Table (Line 0): ENV216_FO_N(101235)
Correction Table (Line 1): ENV216_FO_L1(101235)

3CE_CISPR 22 Class B_N



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EMI Auto Test(2)

2 / 2

Final Result 1

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.172500	52.4	1000.0	9.000	On	N	10.1	12.4	64.8
0.186000	50.5	1000.0	9.000	On	N	10.0	13.7	64.2
0.244500	42.0	1000.0	9.000	On	N	10.0	20.0	61.9
0.420000	39.4	1000.0	9.000	On	N	10.1	18.0	57.4
0.496500	44.0	1000.0	9.000	On	N	10.1	12.1	56.1
0.559500	42.4	1000.0	9.000	On	N	10.1	13.6	56.0

Final Result 2

Frequency (MHz)	CAverage (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Line	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.177000	34.5	1000.0	9.000	On	N	10.1	20.2	54.6
0.492000	29.7	1000.0	9.000	On	N	10.1	16.4	46.1
0.559500	28.4	1000.0	9.000	On	N	10.1	17.6	46.0
0.690000	24.4	1000.0	9.000	On	N	10.0	21.6	46.0
14.208000	42.0	1000.0	9.000	On	N	9.8	8.0	50.0
16.512000	30.7	1000.0	9.000	On	N	9.9	19.3	50.0

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3.2 Radiated Electric Field Emissions (Below 1 GHz)

Test Date

2013-07-24

Test Location

10 m SAC (test distance : ☐ 10 m, ☒ 3 m)

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESCI7	Rohde & Schwarz	100814	2013-12-14	☒
Trilog Broadband Antenna	VULB 9161 SE	SCHWARZBECK	9161-4133	2014-06-11	☒
6dB Attenuator	DNF	Rohde & Schwarz	272.4110.50	2013-11-09	☒
Amplifier	310	Sonoma Instrument Co.	291721	2014-03-21	☒

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

30 MHz to 1 GHz

Instrument Setting

IF Band Width: 120 kHz

Climate Condition

Temperature: (23 ± 1) °C

Relative Humidity: (44 ± 1) %

Atmospheric Pressure: 98 kPa

Test Result

The requirements are: ☒ MET ☐ NOT MET

Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark
73.771	36.6	3.4	Quasi-peak

The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss + 6 dB attenuator – Amp Gain



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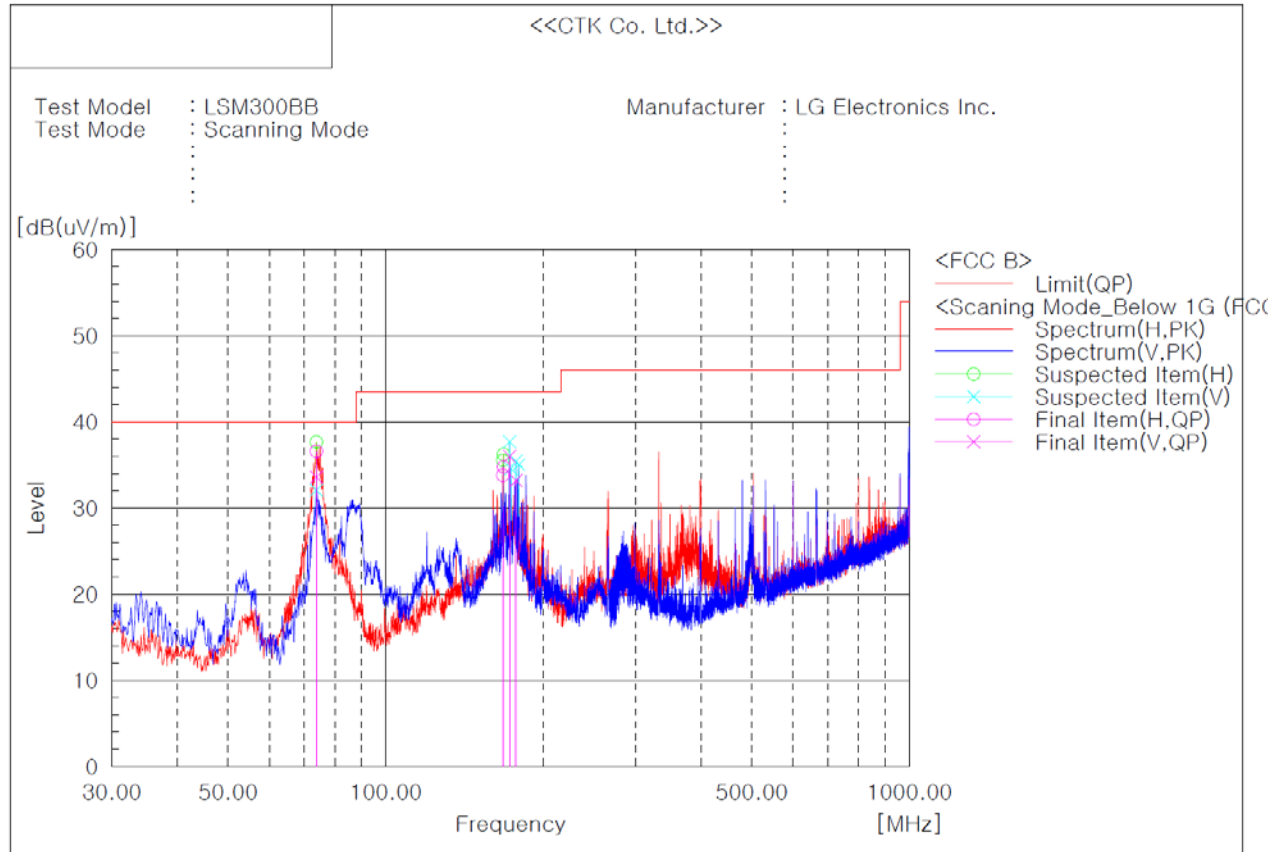
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Test Data



Final Result

No.	Frequency [MHz]	(P)	Reading QP [dB(μV)]	c.f [dB(1/m)]	Result QP [dB(μV/m)]	Limit QP [dB(μV/m)]	Margin QP [dB]	Height [cm]	Angle [deg]
1	73.771	H	52.4	-15.8	36.6	40.0	3.4	291.0	0.0
2	73.771	V	49.4	-15.8	33.6	40.0	6.4	400.0	293.0
3	167.498	H	40.5	-6.7	33.8	43.5	9.7	196.0	290.0
4	167.983	H	41.5	-6.7	34.8	43.5	8.7	196.0	290.0
5	172.469	V	43.6	-7.6	36.0	43.5	7.5	100.0	269.0
6	177.440	V	41.8	-8.6	33.2	43.5	10.3	100.0	120.0



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3.3 Radiated Electric Field Emissions (Above 1 GHz)

Test Date

Not Applicable

Test Location

3 m SAC

Test Equipment

Name of Equipment	Model No.	Manufacturer	Serial No.	Due Date	Applied
EMI Test Receiver	ESU40	Rohde & Schwarz	100336	2014-06-27	☐
Double Ridged Guide Antenna	3115	ETS-Lindgren	78895	2015-02-28	☐
Preamplifier	8449B	Agilent Technologies	3008A02307	2013-11-09	☐

Test Software

TOYO EMI software Ver. 5.1.0

Frequency Range of Measurement

1 GHz to 6 GHz

Instrument Setting

IF Band Width: 1 MHz

Climate Condition

Temperature:

Relative Humidity:

Atmospheric Pressure:

Test Result

The requirements are: ☐ MET ☐ NOT MET

Frequency (MHz)	Measured Data (dBμV/m)	Margin (dB)	Remark

The Result is calculated by using the following formula;

* Result = Reading + Correction factor

* Correction factor = Antenna Factor + Cable Loss– Amp Gain

Test Data



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APPENDIX A - Test Setup Photos and Configuration



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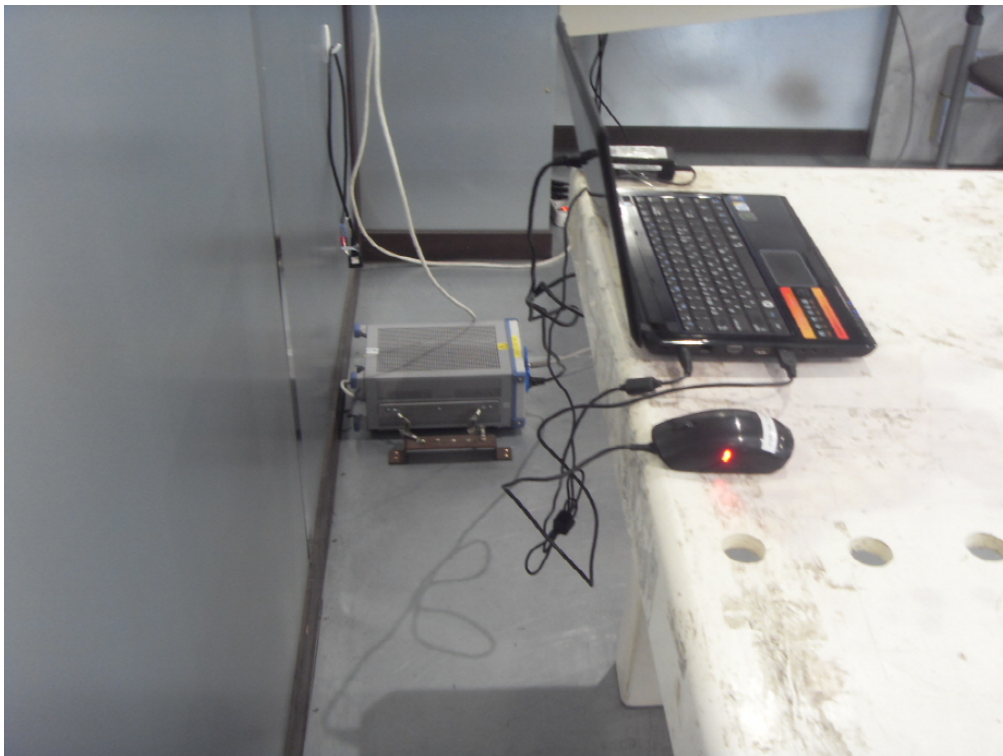
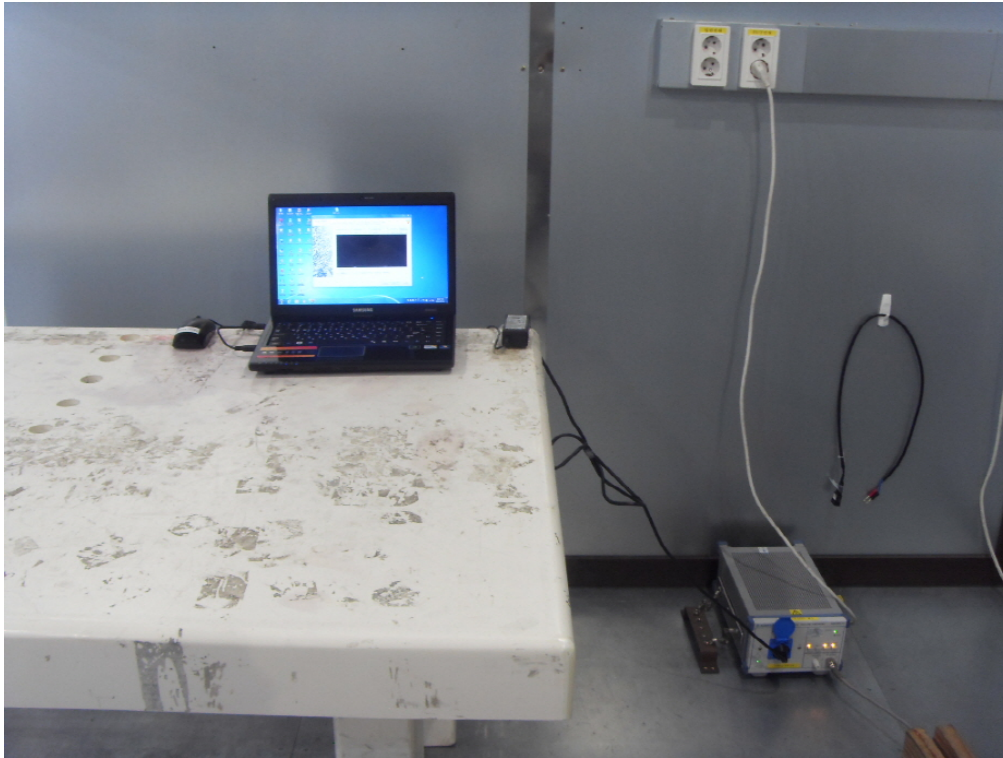
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Conducted Voltage Emissions of Mains Ports





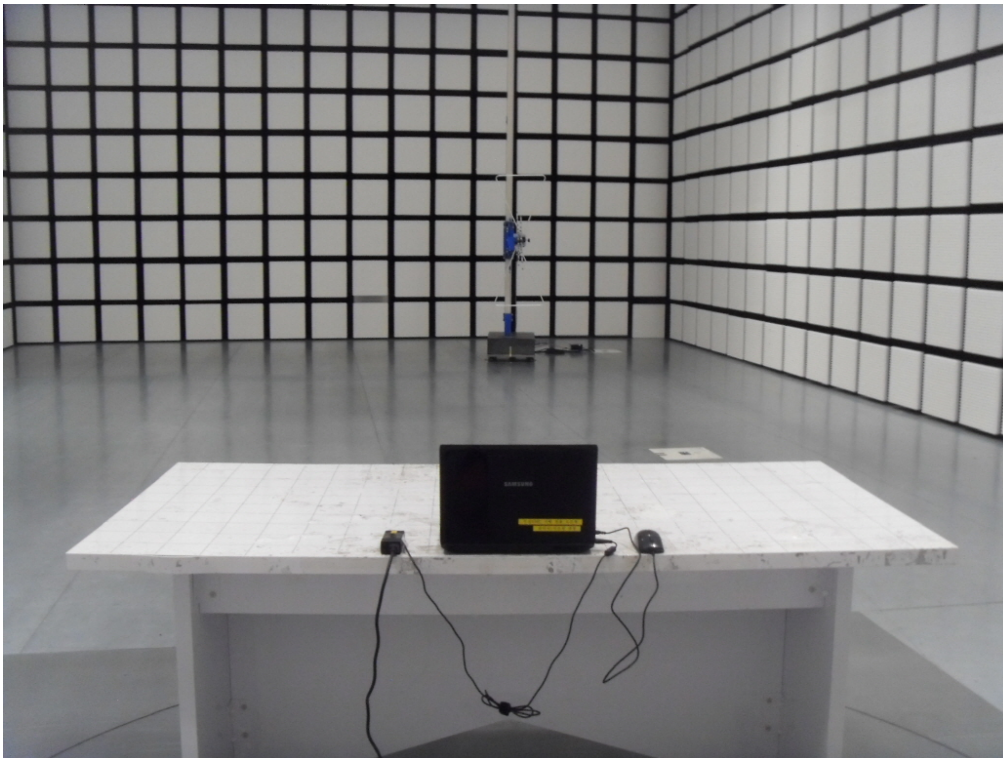
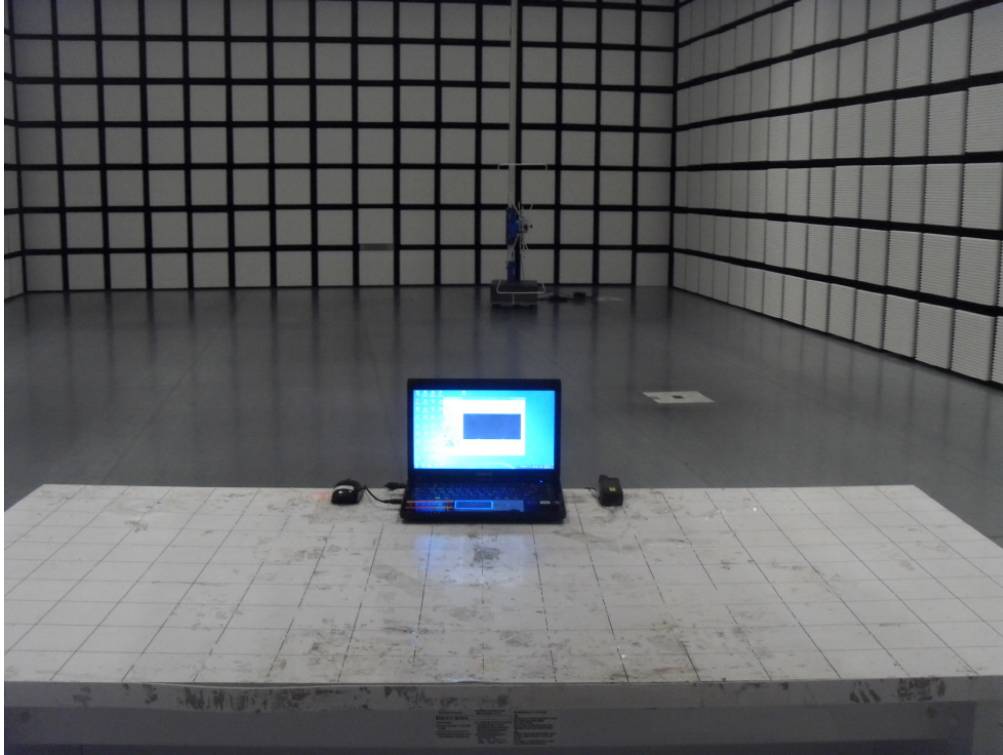
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Radiated Electric Field Emissions (Below 1 GHz)





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Radiated Electric Field Emissions (Above 1 GHz)

Not Applicable



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APPENDIX B – EUT Photographs

EUT External Photographs





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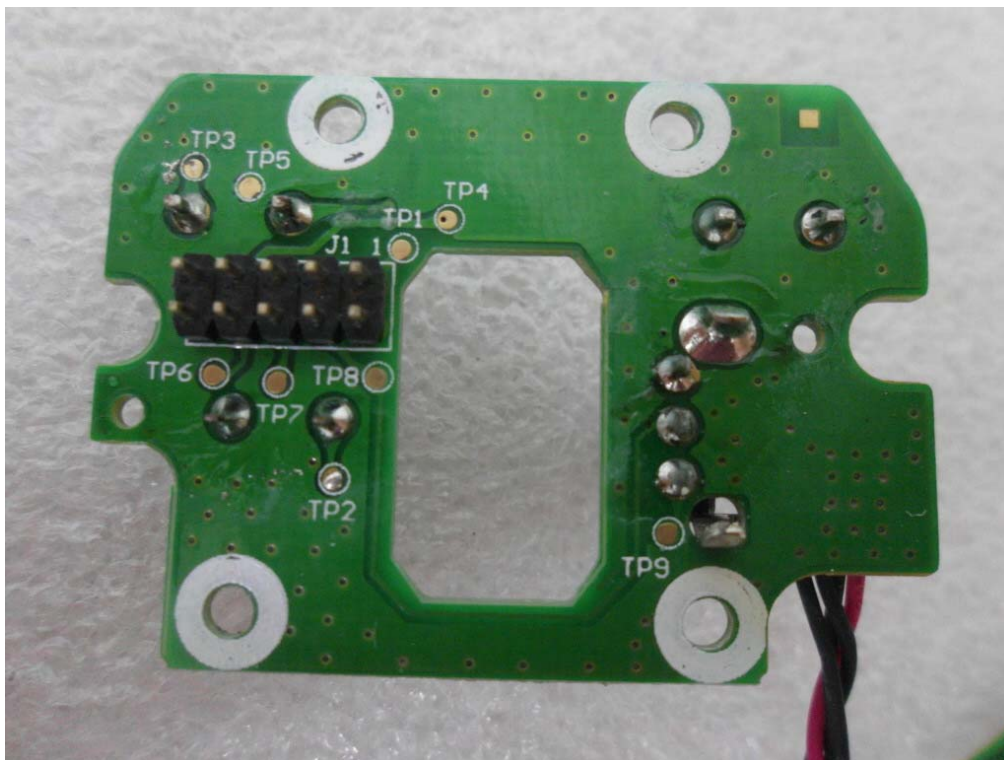
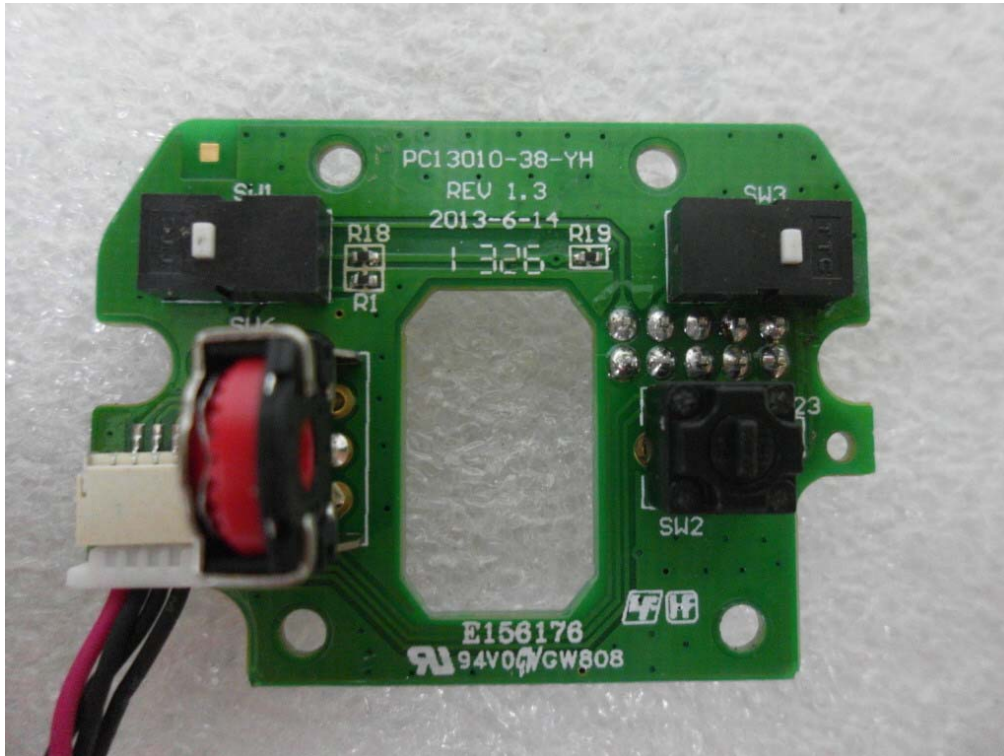
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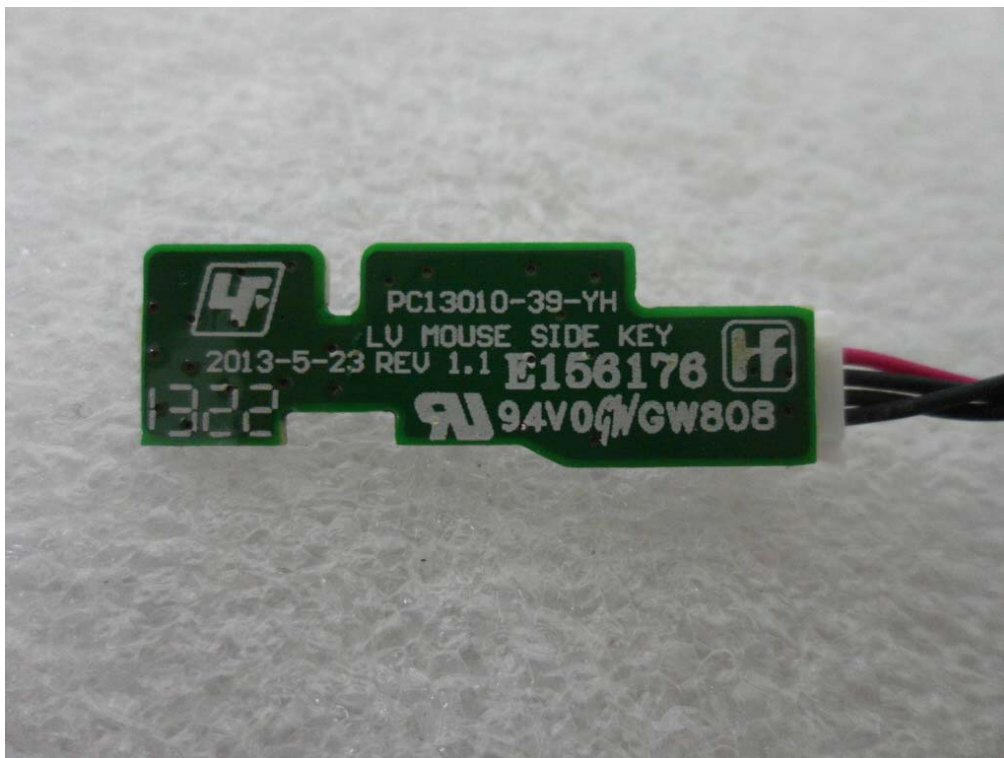
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